PB87-194650

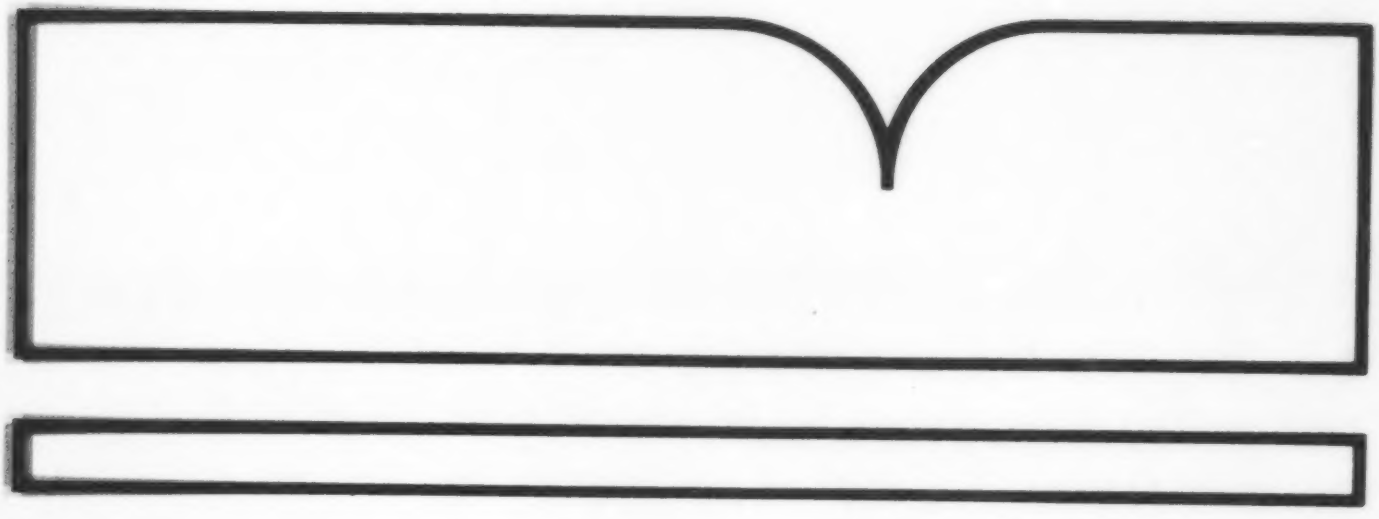
Collection of Lead Poisoned Catalysts in Houston

Southwest Research Inst., San Antonio, TX

Prepared for

Environmental Protection Agency, Ann Arbor, MI

Sep 86



U.S. Department of Commerce
National Technical Information Service
NTIS

PB87-194650

EPA-AA-TSS-I/M-86-8

Technical Report

Collection of Lead Poisoned Catalysts in Houston

By

Craig A. Harvey

September 1986

NOTICE

Technical Reports do not necessarily represent final EPA decisions or positions. They are intended to present technical analysis of issues using data which are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments which may form the basis for a final EPA decision, position or regulatory action.

Technical Support Staff
Emission Control Technology Division
Office of Mobile Sources
Office of Air and Radiation
U. S. Environmental Protection Agency

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This report describes a project invloving the testing of lead-poisoned catalytic converters in the Houston, Texas area. Five lead-poisoned catalyts were collected from motor vehicles. Various methods to evaluate the conditions of the degraded catalyts included weight and backpressure measurements, and x-ray diffraction to define substrate structure.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air Pollution Exhaust Emissions Motor Vehicles Catalytic Converters Tests	Lead Deposits Plumbtesmo	

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September 29, 1986

TO: Mr. Craig A. Harvey, Project Officer
Emission Control Technology Division
Environmental Protection Agency
2565 Plymouth Road
Ann Arbor, MI 48105

FROM: Daniel A. Montalvo and Charles T. Hare
Department of Emissions Research
Southwest Research Institute
6220 Culebra Road
San Antonio, TX 78284

SUBJECT: Monthly Progress Report No. 8 for the period August 31 through September 29, 1986; Work Assignment No. 2-16, Contract 68-03-3192, "Collection of Lead Poisoned Catalysts in Houston," SwRI Project 03-7774-016.

I. INTRODUCTION

This project was conducted to complete the passenger car and light truck lead-poisoned catalyst collection begun in the Houston, Texas area under Work Assignment No. 11 of this contract. Five lead-poisoned catalysts were collected under Work Assignment No. 11; five additional catalysts were to be collected under Work Assignment No. 2-16. Various methods to evaluate the conditions of the degraded catalysts include weight and backpressure measurements, and x-ray diffraction to define substrate structure.

This report is the last monthly progress and expenditure report to be submitted to EPA under Work Assignment No. 2-16, Contract 68-03-3192, and also constitutes the final report for the same assignment. Procurement of five or less additional lead-poisoned catalysts under this assignment was not achieved based on inspection stations reporting a very low number of failures due to positive Plumbtesmo tests and/or tampered fuel inlets. This type of failures were much less than one percent of an average 5000 I/M inspections conducted per month as indicated on reports from inspection stations found in Appendix A to this report. Major reasons suggested by inspection stations for the small rejection numbers are as follows:

1. Vehicle owners are more aware of stringent I/M inspection program which requires costly replacement of poisoned catalysts and/or tampered fuel inlets.

2. Some inspection stations are located in affluent areas where need or reason for misfueling is less apparent.

3. Recent comparable prices for leaded and unleaded gasoline.

Of those few gasoline vehicles rejected for positive Plumbtesmo tests and/or tampered fuel inlet, inspection stations report some owners likely do their own replacement work or seek other stations to approve their vehicles without need for catalyst and/or fuel inlet replacement. During the course of Work Assignments No. 11 and 2-16, Intercol reported it received only five calls from vehicle owners with poisoned catalysts; all five vehicles were accepted.

II. WORK ACCOMPLISHED DURING THE CURRENT REPORTING PERIOD

Since no further calls were received at Intercol from owners of vehicles with poisoned catalysts and/or tampered fuel inlets during Work Assignment No. 2-16, this report serves to summarize inspection and testing results obtained with the five catalysts and corresponding fuel samples procured during Work Assignment No. 11.

Table 1 lists the five vehicles converted at Intercol. For identification purposes in this report and for subsequent shipping to EPA, the vehicle numbers are also used to identify corresponding poisoned catalysts. A brief description of the poisoned catalysts along with results of the visual inspections and x-ray analyses, and atomic absorption analyses with corresponding fuel samples is provided in Table 2. More descriptive individual reports for Catalysts No. 1 through No. 5 are presented in Appendices B through F, respectively. Included in Appendices B through F are copies of the new OEM catalyst purchase receipts with source and individual price noted therein.

Table 2 shows that four catalysts were in good overall physical condition as evidenced by visual and x-ray inspections. Catalyst No. 2 was the exception by showing a large meltdown area in the outlet monolith region. With the exception of Catalyst No. 5, all catalysts tested positive with the Plumbtesmo test. It is unclear why Catalyst No. 5 indicated negative at its inlet (testing was repeated several times to confirm). Catalyst HC and CO efficiencies were highest with Catalyst No. 2, 3, and 5. Catalyst No. 2 presented the highest HC (82.7%), CO (96.4%), and NO_x (42.6%) efficiencies of the five catalysts in spite of the meltdown zone and relatively high mileage (62,371) noted for this catalyst. Lead content of the fuel tank samples analyzed by atomic absorption indicated values (0.002 g/gal or less) normally found in unleaded gasoline.

III. QUALITY ASSURANCE

Catalyst backpressures and conversion efficiencies were determined at SwRI using laboratory procedures evaluated for repeatability as specified in the Final Report of Work Assignment No. 20, EPA Contract 68-03-3192. As specified by the Project Officer, atomic absorption lead values determined at SwRI for the fuel tank gasoline samples will be evaluated for accuracy by EPA, using the lead content values also determined for EPA reference samples by SwRI as reported in the individual catalyst test reports in Appendices B through F of this report.

IV. CATALYST SHIPMENT TO EPA

At the termination of Work Assignment No. 2-16 the five catalysts discussed in this report will be shipped by Motor Freight to the attention of the

TABLE 1. VEHICLES CONVERTED AT INTERCOL

Vehicle No.	Mfr/Engine Family	Model	Engine CID	Engine Liters	Vehicle Type	Carb.	Engine Cylinders	Control System
5[a]	1980 Ford/2000[b]	Courier	120	2.0	LDT	2BBL	L4	EGR/PLS/OC
3[a]	1981Datsun/CNS15V2AAF6[c]	210	91	1.5	LDV	2BBL	L4	EGR/PLS/OC
2[a]	1982 Ford/CFM1.6V2GKC2[d]	Escort	98	1.6	LDV	2BBL	L-4	EGR/AIR/OC/3W
1[a]	1982 Ford/CFM50T2AAF4[e]	F150	302	5.0	LDT	2BBL	V-8	EGR/AIR/OC
4[a]	1982 Ford/CFM50T2AAF4[e]	F150	302	5.0	LDT	2BBL	V-8	EGR/AIR/OC

[a]Failed Plumbtesmo Test
[b]Vehicle is not included in 1980 Vehicle Eligibility List, but was approved by EPA Project Officer for candidacy
[c]Vehicle corresponds to Item No. 12 of 1981 Vehicle Eligibility List
[d]Vehicle corresponds to Item No. 15 of 1982 Vehicle Eligibility List
[e]Vehicle corresponds to Item No. 21 of 1982 Vehicle Eligibility List, but is considered eligible only as a 1980 Model (i.e., 5 maximum in overall catalyst collection)

TABLE 2. SUMMARY OF INSPECTION AND TESTING PERFORMED ON POISONED CATALYSTS AND FUEL SAMPLES

Vehicle			Catalyst					
No.	Model	Odometer Mileage	Type	Visual Inspection Rating	X-Ray Analysis	Plumbtesmo Test[a] Inlet	Plumbtesmo Test[a] Outlet	Backpressure, in. H_2O[b]
5	1980 Ford Courier	81176	Single-bed pelleted	Good	No abnormality	N	P	5.0
3	1981 Datsun 210	46312	Single-bed monolith	Good	No abnormality	P	P	4.0
2	1982 Ford Escort	62371	Dual-bed monolith with air inlet port	Good	Large meltdown area at outlet monolith	P	P	4.3
1	1982 Ford F150	47830	Dual-bed monolith	Good	No abnormality	P	P	11.8
4	1982 Ford F150	86610	Dual-bed monolith	Good	No abnormality	P	P	8.7

Vehicle			Catalyst Efficiency, %[b]			Fuel Tank Sample
No.	Model	Odometer Mileage	HC	CO	NO_x	Lead (Pb), g/gal
5	1980 Ford Courier	81176	54.8	66.7	5.3	0.002
3	1981 Datsun 210	46312	72.7	85.4	11.3	0.001
2	1982 Ford Escort	62371	82.7	96.4	42.6	0.001
1	1982 Ford F150	47830	10.7	1.7	2.6	0.002
4	1982 Ford F150	86610	28.6	29.1	2.5	0.002

[a]Plumbtesmo Test: P = positive, N = Negative
[b]Engine conditions: 1800 rpm, load adjusted to give catalyst inlet temperature of 730 ± 30°F, 14.6 air/fuel ratio

Branch Technical Representative at the EPA in Ann Arbor, Michigan. Each catalyst will be identified with the corresponding vehicle number, Work Assignment Number, and Contract Number.

VI. EXPENDITURES

Projected and actual expenditures for Assignment No. 2-16 are shown in Figure 1. As of September 12, 1986, expenditures were $7,205.26 or 67.88 percent of the projected total.

Submitted by:

Daniel A. Montalvo
Research Physicist
Department of Emissions Research

Approved by:

Charles T. Hare
Director
Department of Emissions Research

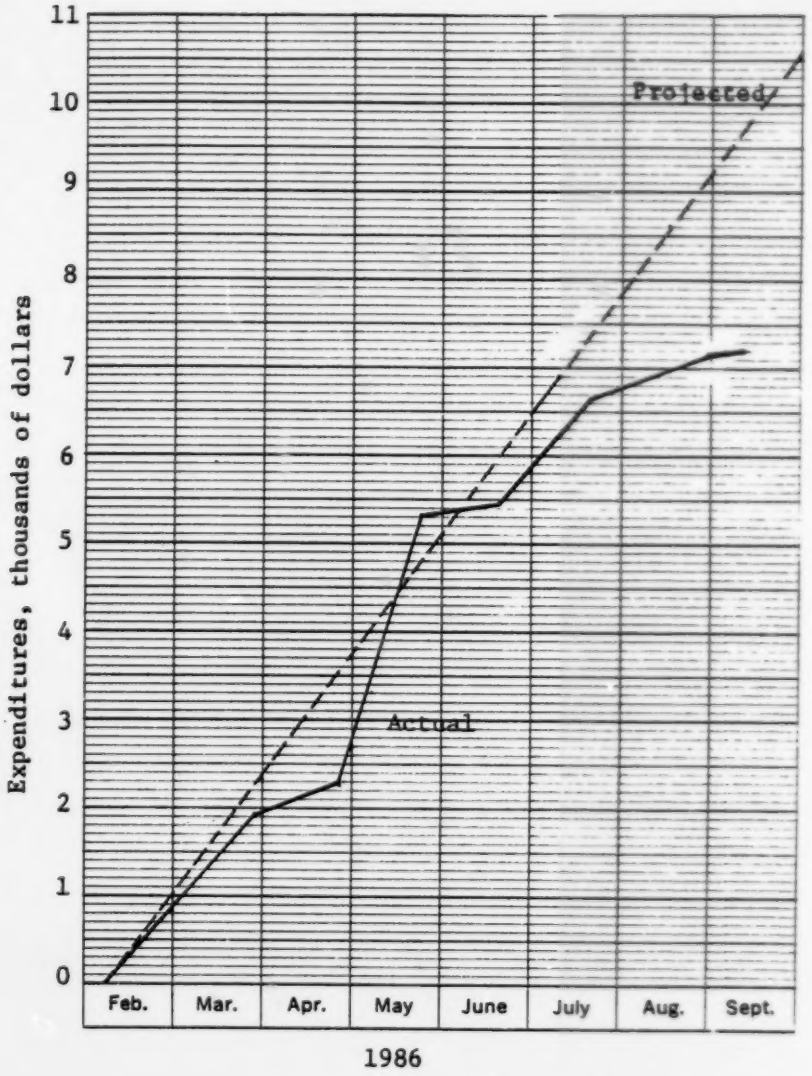


Figure 1. Projected and Actual Expenditures for Work Assignment No. 2-16
Contract 68-03-3192, Project 03-7774-016

APPENDIX A

LIST OF INSPECTION STATIONS

TABLE 1. AVERAGE NUMBER OF STATE INSPECTIONS AND FAILURES REPORTED BY HARRIS COUNTY INSPECTION STATIONS

Inspection Station	Average Number of Inspections per Month	Number of Failures
E.T. Auto Service	200	2[a]
Exxon Company USA 2920	500	0
Mort Hall Ford, Inc.	4	0
Lindale Electric	600	0
Marks N. Main Gulf	700	2[a] 2[b]
Perry State Inspection Service	400	0
Preston Auto Repair	200	0
Frontier Ford	4	15[a]
Whites (F.E. Doe, Inc.)	450	0
Tony's Service Station	400	0
Mike Hall Dodge/Mazda	4	0
Johnny Moran Texaco	300	0
Painter's Mobil	600	0
Ferranti & Sons	200	1[a,c]
P & M Automotive	150	0
T's, Inc.	150	0
1960 Gulf	150	2[a]

[a]Failed because of positive Plumbtesmo test and/or modified fuel inlet
[b]Vehicles had no catalyst
[c]Did not provide solicitation letter

APPENDIX B

INDIVIDUAL TEST REPORT
FOR CATALYST NO. 1

REPORT OF INTERCOL'S CONFIRMATORY INSPECTION FOR MISFUELED 1980-83 LIGHT-DUTY GASOLINE PASSENGER CARS AND TRUCKS IN HOUSTON, TEXAS

INSPECTION STATION: NAME P+M AUTOMOTIVE
ADDRESS 23503 HARDY RD
PHONE NO. 353-7034

FAILED INSPECTION: DATE 9/84 ORIGINAL -- PREVIOUS / ODOMETER 47831

FAILURE: MODIFIED FUEL INLET YES AND/OR POSITIVE PLUMBTESMO TEST POS

VEHICLE OWNER: NAME HAUS UTILITY SERVICE
ADDRESS 2200 SCIANCA
PHONE NO. 353-9889

VEHICLE NO.: SWRI #1 LICENSE: STATE TX YEAR 85 NO. VA 437Z
MAKE FORD YEAR '82 MODEL F150 GVWR 2650
MFR/ENGINE FAMILY ____ LDV ____ LDT X
VIN 1FTDF15E8CPA92595 BODY TYPE PICK-UP
ENGINE SERIAL NO.: N/A ENGINE SIZE: CID 302 LITERS ____
ENGINE: TYPE/EMISSION FAMILY ____ CYLINDERS 8
FUEL SYSTEM: CARBURETOR X BARRELS 2 INJECTION ____
POLLUTION CONTROL SYSTEM ELR-AIP-OC
VEHICLE CLASSIFICATION/TABLE 1: YEAR 82 NO. N/A

INITIAL INSPECTION AT INTERCOL: DATE 8/21 INSPECTOR B.OBRY
OEM CATALYST: YES X NO ____ MODIFIED FUEL INLET: YES ____ NO X
PLUMBTESMO: POSITIVE X NEGATIVE ____ FUEL SAMPLE OBTAINED YES
ELIGIBILITY STATUS: ACCEPT X REJECT ____ ODOMETER ____
OEM CATALYST/EXHAUST AND/OR FUEL SYSTEM CONDITION: CAT + MUFFLER TO BE REPLACED
EXHAUST AND/OR FUEL SYSTEM PARTS REQUIRED: ____
DATE EXHAUST AND/OR FUEL SYSTEM PARTS ORDERED 9/26/85
DATE EXHAUST AND/OR FUEL SYSTEM PARTS RECEIVED 9/26 DATE OWNER CONTACTED 9/26
DATE EXHAUST AND/OR FUEL SYSTEM PARTS INSTALLED 9/27/85
DATE FUEL TANK TOPPED WITH UNLEADED FUEL NO

CODING OF INDIVIDUAL PARTS FOR INSPECTION AND ANALYSIS AT SWRI: TAG OR PAINT SWRI VEHICLE NO. AND ENGINE SERIAL NO. ON EACH PART:

CATALYST #1 (IDENTIFY INLET, OUTLET, AND TOP SIDES: SEAL INLET/OUTLET ENDS/TAPE)
OXYGEN SENSOR NONE
FUEL SAMPLE #1 (SEAL CAP WITH TEFLON TAPE)
DATE SWRI NOTIFIED PARTS ARE READY FOR PICKUP 9/27/85
DATE PARTS PICKED UP 9/30/85

11

DATE 3/31/86

WORK ASSIGNMENT NO. 2-16
"CONTINUATION OF HOUSTON CATALYST COLLECTION"
(SwRI PROJECT 03-7774-016)

CATALYST NO. 1

Vehicle SwRI Code 1 Odometer Miles 47830 Vehicle Year and Make 1982 Ford Model F150 Pickup Vehicle VIN 1FTDF15FOCPA92595

Engine Family CFM50T2AAF4 Engine: CID 302 Liters 5.0

Engine Cyls. V8 Emission Control System EGR/AIR/OC

Fuel System: Carburetor 2BBL Fuel Injection _____

Date Vehicle Failed Inspection: Original _____ Previous 9/84

Failure Type: Modified Fuel Inlet No and/or Positive Plumbtesmo Test Yes

Date Exhaust and/or Fuel System Parts Installed 9/27/85

CATALYST NO. 1 (CONT'D)

Visual Inspection Summary In-line dual bed monolith catalyst with rusty case but in good condition showing no evidence of overheating. No internal looseness. Monolith is dark gray at inlet and light gray on outlet. No fractures, melts, or plugging.

Testing

Catalyst Weight, lb * 12.27 Approximate Dimensions 17x8x3 in.

Plumbtesmo Test: Catalyst Inlet Positive Outlet Positive

Oxygen Sensor N/A

Catalyst X-Ray shows no abnormality

See positive photo of x-ray negative on next page.

Catalyst Backpressure, in. H_2O: 11.8 at Catalyst Inlet Temperature °F 730,

Engine RPM 1800, Engine Torque, ft/lb 43.6,

and Equivalent Engine CID of 305 (5.0 liter)

Catalyst Efficiency (%) HC 10.7 CO 1.7 NO_x 2.6

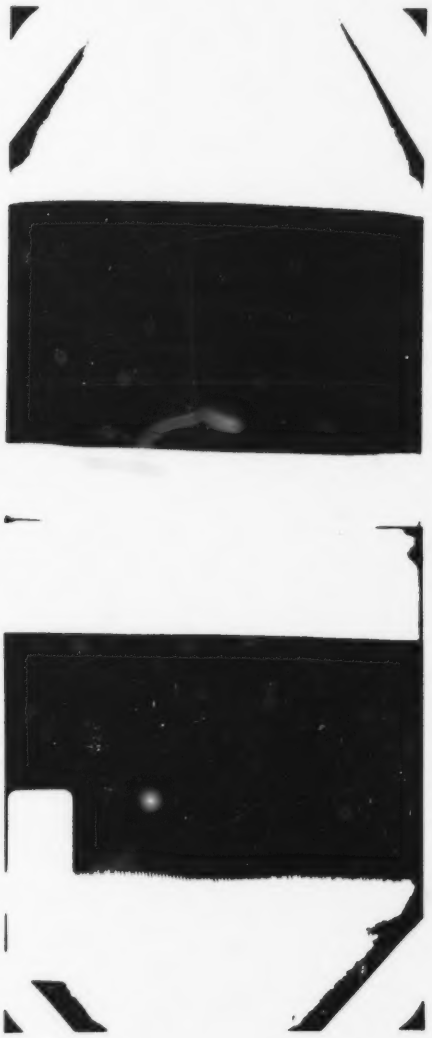
Atomic Absorption Lead Content Analysis for:

Sample	Pb, g/gal
Gasoline Sample # 1	0.002
EPA Reference 0001028	0.08
EPA Reference 0001975	0.017

*Catalyst weight includes weight of inlet and outlet pipes when integral to catalyst

CATALYST NO. 1 (CONT'D)

INLET



OUTLET

Positive Photo of X-Ray Negative - Catalyst No. 1

Vehicle No. 1

ORIGINAL INVOICE

PARTS INVOICE

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PAGE 01 OF 01

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1	[redacted]									
2	[redacted]			E3ZZ,8620,A	WALL	A	BELT DRIVE-RIBBED (M	42.2[illegible]	[illegible].[illegible]	[illegible].83
3	10	10		E5ØZ,9F472,A	141	C	SENSOR ASSY EXHAST G	65.9[illegible]	45.41	454.10
							CASH SALES			1047.93

Pd 8407

NO RETURNS WITHOUT THIS INVOICE — TERMS NET CASH
NO REFUNDS AFTER 30 DAYS
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15% HANDLING CHARGE ON ALL RETURNED PARTS

X _____ RECEIVED BY

K3487 (8-82)

APPENDIX C

INDIVIDUAL TEST REPORT
FOR CATALYST NO. 2

REPORT OF INTERCOL'S CONFIRMATORY INSPECTION FOR
MISFUELED 1980-83 LIGHT-DUTY GASOLINE PASSENGER
CARS AND TRUCKS IN HOUSTON, TEXAS

INSPECTION STATION: NAME MILDRED PAINTS

ADDRESS

PHONE NO.

FAILED INSPECTION: DATE 5/14/85 ORIGINAL X PREVIOUS ODOMETER 62371

FAILURE: MODIFIED FUEL INLET YES AND/OR POSITIVE PLUMBTESMO TEST YES.

VEHICLE OWNER: NAME RAYMOND L. MATLOCK

ADDRESS 2507 SHADY RAIN

PHONE NO. 351-9845

VEHICLE NO.: SWRI #2 LICENSE: STATE TX YEAR 85 NO. YXB654

MAKE FORD YEAR 82 MODEL ESCORT GVWR 3130

MFR/ENGINE FAMILY LDV X LDT

VIN 1FABP1623CW164556 BODY TYPE 4 DR.

ENGINE SERIAL NO.: U/A ENGINE SIZE: CID LITERS 1.6

ENGINE: TYPE CEM 1.6 L2 CYLINDERS 4

FUEL SYSTEM: CARBURETOR X BARRELS 2 INJECTION

POLLUTION CONTROL SYSTEM EGR-AIP-TWC

VEHICLE CLASSIFICATION/TABLE 1: YEAR 82 NO. 15

INITIAL INSPECTION AT INTERCOL: DATE 8/23 INSPECTOR BARRY

OEM CATALYST: YES X NO MODIFIED FUEL INLET: YES NO X

PLUMBTESMO: POSITIVE X NEGATIVE FUEL SAMPLE OBTAINED YES

ELIGIBILITY STATUS: ACCEPT X REJECT ODOMETER

OEM CATALYST/EXHAUST AND/OR FUEL SYSTEM CONDITION: OK CAT + TP
ONLY

EXHAUST AND/OR FUEL SYSTEM PARTS REQUIRED: 8/26/85

DATE EXHAUST AND/OR FUEL SYSTEM PARTS ORDERED 8/26/85

DATE EXHAUST AND/OR FUEL SYSTEM PARTS RECEIVED 9/5 DATE OWNER CONTACTED 9/5

DATE EXHAUST AND/OR FUEL SYSTEM PARTS INSTALLED 9/7/85

DATE FUEL TANK TOPPED WITH UNLEADED FUEL YES

CODING OF INDIVIDUAL PARTS FOR INSPECTION AND ANALYSIS AT SWRI: TAG OR PAINT SWRI VEHICLE NO. AND ENGINE SERIAL NO. ON EACH PART:

CATALYST #2 (IDENTIFY INLET, OUTLET, AND TOP SIDES: SEAL INLET/OUTLET ENDS/TAPE)

OXYGEN SENSOR NONE

FUEL SAMPLE #2 (SEAL CAP WITH TEFLON TAPE)

DATE SWRI NOTIFIED PARTS ARE READY FOR PICKUP 9/27/85

DATE PARTS PICKED UP 9/30/85

DATE 3/31/86

WORK ASSIGNMENT NO. 2-16
"CONTINUATION OF HOUSTON CATALYST COLLECTION"
(SwRI PROJECT 03-7774-016)

CATALYST NO. 2

Vehicle SwRI Code 2 Odometer Miles 62371 Vehicle Year and Make 1982

Ford Model Escort 4Dr Sedan Vehicle VIN 1FABP0623CW164556

Engine Family CFM1.6V2GKC2 Engine: CID 98 Liters 1.6

Engine Cylc. L4 Emission Control System EGR/AIR/OC/3W

Fuel System: Carburetor 2BBL Fuel Injection

Date Vehicle Failed Inspection: Original 5/14/85 Previous

Failure Type: Modified Fuel Inlet No and/or Positive Plumbtesmo Test Yes

Date Exhaust and/or Fuel System Parts Installed 9/7/85

CATALYST NO. 2 (CONT'D)

Visual Inspection Summary In-line dual-bed catalyst with air inlet port between beds. No evidence of overheating. Case appears in good condition in spite of small hole melted into top outer shield during removal from vehicle. No internal looseness. Cannot view face on inlet monolith because of curved inlet pipe. Outlet monolith, however, shows some evidence of meltdown below face surface (see x-ray results below). Outlet monolith also indicates partial plugging with dark gray appearance.

Reproduced from best available copy.

Testing

Catalyst Weight, lb* 13.40 Approximate Dimensions 12x8 1/2x4 in.

Plumbtesmo Test: Catalyst Inlet Positive Outlet Positive

Oxygen Sensor N/A

Catalyst X-Ray shows large area of apparent meltdown at outlet monolith

See positive photo of x-ray negative on next page.

Catalyst Backpressure, in. H_2O: 4.3 at Catalyst Inlet Temperature °F 730,

Engine RPM 1800, Engine Torque, ft/lb 75.6,

and Equivalent Engine CID of 128 (2.1 liter)

Catalyst Efficiency (%) HC 82.7 CO 96.4 NO_x 42.6

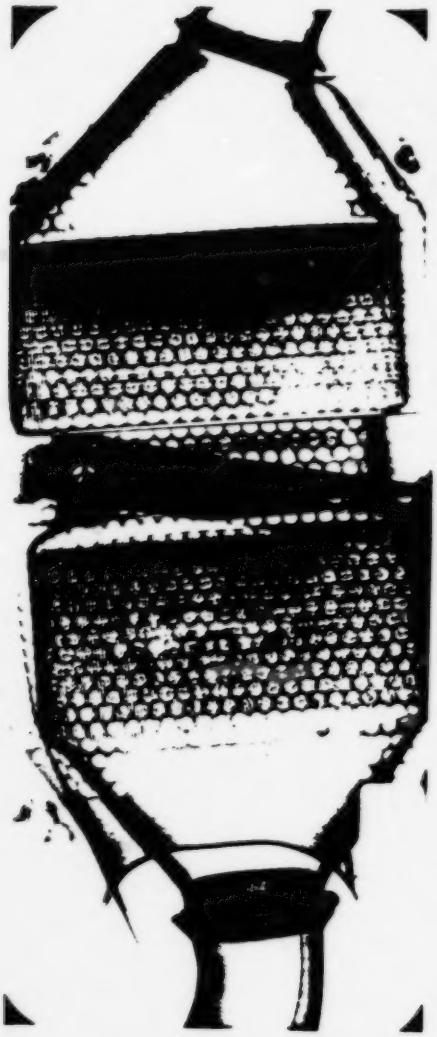
Atomic Absorption Lead Content Analysis for:

Sample	Pb, g/gal
Gasoline Sample # -	0.001
EPA Reference [illegible]	0.08
EPA Reference [illegible]	0.017

*Catalyst weight includes weight of inlet and outlet pipes when integral to catalyst

CATALYST NO. 2 (CONT'D)

INLET



OUTLET

Positive Photo of X-Ray Negative - Catalyst No. 2

Vehicle No. 2

PARTS INVOICE

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						PAGE	OF

SOLD TO

SHIP TO

ITEM NO.	ORDERED	SHIPPED	B/O	PART NUMBER	BIN	SR	DESCRIPTION	SUGGESTED LIST	NET	TOTAL NET

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NO MERCHANDISE NEW OR USED ACCEPTED FOR REFUND AFTER 10 DAYS FROM DATE OF INVOICE.
NO CLAIMS CONSIDERED WITHOUT THIS INVOICE
NO REFUND ON ALL ELECTRICAL PARTS.

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APPENDIX D

INDIVIDUAL TEST REPORT
FOR CATALYST NO. 3

REPORT OF INTERCOL'S CONFIRMATORY INSPECTION FOR MISFUELED 1980-83 LIGHT-DUTY GASOLINE PASSENGER CARS AND TRUCKS IN HOUSTON, TEXAS

INSPECTION STATION: NAME Mildred Paints

ADDRESS

PHONE NO.

FAILED INSPECTION: DATE 8/27/85 ORIGINAL X PREVIOUS ODOMETER 46312

FAILURE: MODIFIED FUEL INLET YES AND/OR POSITIVE PLUMBTESMO TEST YES

VEHICLE OWNER: NAME Raymond G. Matlock

ADDRESS 2507 Shady Knoll

PHONE NO. 351-9845

VEHICLE NO.: SWRI #3 LICENSE: STATE TX YEAR 86 NO. ZVJ 208

MAKE DATSUN YEAR 81 MODEL 210 SL S/W GVWR 2865

MFR/ENGINE FAMILY LDV X LDT

VIN JN1PB05S1CU215168 BODY TYPE STATION WAGON

ENGINE SERIAL NO.: N/A ENGINE SIZE: CID 97.8 LITERS

ENGINE: TYPE CLG REV V2 MFI CYLINDERS 4

FUEL SYSTEM: CARBURETOR X BARRELS 2 INJECTION

POLLUTION CONTROL SYSTEM EGR-AIP-OC

VEHICLE CLASSIFICATION/TABLE 1: YEAR 82 NO. 12

INITIAL INSPECTION AT INTERCOL: DATE 8/27 INSPECTOR BOBBY

OEM CATALYST: YES X NO MODIFIED FUEL INLET: YES NO X

PLUMBTESMO: POSITIVE X NEGATIVE FUEL SAMPLE OBTAINED

ELIGIBILITY STATUS: ACCEPT X REJECT ODOMETER

OEM CATALYST/EXHAUST AND/OR FUEL SYSTEM CONDITION: OK CAT + T/P DENT

EXHAUST AND/OR FUEL SYSTEM PARTS REQUIRED:

DATE EXHAUST AND/OR FUEL SYSTEM PARTS ORDERED 9/10/86

DATE EXHAUST AND/OR FUEL SYSTEM PARTS RECEIVED 9/12 DATE OWNER CONTACTED 9/14

DATE EXHAUST AND/OR FUEL SYSTEM PARTS INSTALLED 9/18/85

DATE FUEL TANK TOPPED WITH UNLEADED FUEL YES

CODING OF INDIVIDUAL PARTS FOR INSPECTION AND ANALYSIS AT SWRI: TAG OR PAINT SWRI VEHICLE NO. AND ENGINE SERIAL NO. ON EACH PART:

CATALYST #3 (IDENTIFY INLET, OUTLET, AND TOP SIDES: SEAL INLET/OUTLET ENDS/TAPE)

OXYGEN SENSOR NONE

FUEL SAMPLE #3 (SEAL CAP WITH TEFLON TAPE)

DATE SWRI NOTIFIED PARTS ARE READY FOR PICKUP 9/27/85

DATE PARTS PICKED UP 9/30/85

DATE 3/31/86

WORK ASSIGNMENT NO. 2-16
"CONTINUATION OF HOUSTON CATALYST COLLECTION"
(SwRI PROJECT 03-7774-016)

CATALYST NO. 3

NO.3

Reproduced from best available copy.

Vehicle SwRI Code 3 Odometer Miles 46312 Vehicle Year and Make 1981

Datsun Model 210SL 4Dr Sedan Vehicle VIN JH1PB05SICU205068

Engine Family CNS15V2AAF6 Engine: CID 91 Liters 1.5

Engine Cyls. L4 Emission Control System EGR/PLS/OC

Fuel System: Carburetor 2BBL Fuel Injection

Date Vehicle Failed Inspection: Original 8/27/85 Previous

Failure Type: Modified Fuel Inlet and/or Positive Plumbtesmo Test Yes

Date Exhaust and/or Fuel System Parts Installed 9/18/85

CATALYST NO. 3 (CONT'D)

Visual Inspection Summary Single bed monolith in good, clean condition (some rust on top side). No internal looseness or evidence of overheating. Both monolith faces (inlet and outlet) show clean light-gray colored appearance.

Testing

Catalyst Weight, lb* 8.31 Approximate Dimensions 13 1/4x7 1/4x3 in.

Plumbtesmo Test: Catalyst Inlet Positive Outlet Positive

Oxygen Sensor N/A

Catalyst X-Ray Shows no abnormality

See positive photo of x-ray negative on next page.

Catalyst Backpressure, in. H_2O: 4.0 at Catalyst Inlet Temperature °F 730,

Engine RPM 1800, Engine Torque, ft/lb 83.1,

and Equivalent Engine CID of 128 (2.1 liter)

Catalyst Efficiency (%) HC 72.7 CO 85.4 NO_x 11.3

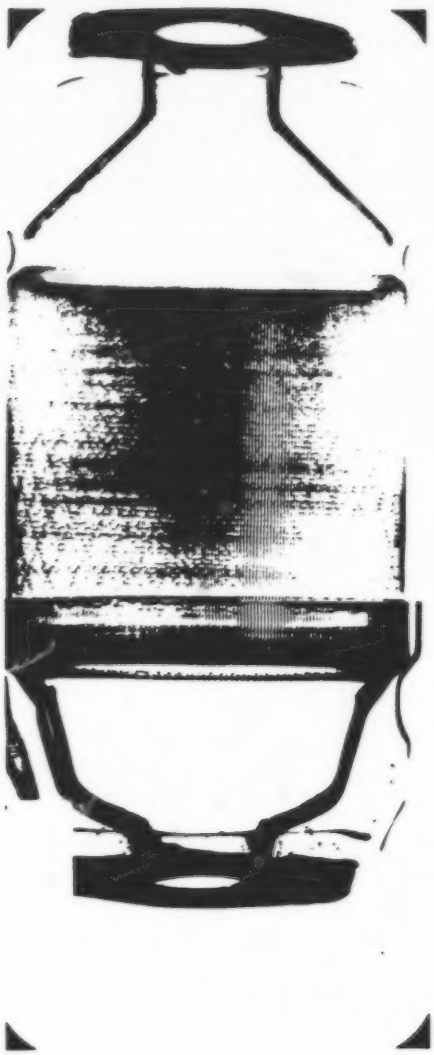
Atomic Absorption Lead Content Analysis for:

Sample	Pb, g/gal
Gasoline Sample # 3	0.001
EPA Reference 0001028	0.08
EPA Reference 001975	0.017

*Catalyst weight includes weight of inlet and outlet pipes when integral to catalyst

CATALYST NO. 3 (CONT'D)

INLET



OUTLET

Positive Photo of X-Ray Negative - Catalyst No. 3

Vehicle No. 3

NAME INTERCON CORP DATE 9-13 1985 1567

ADDRESS 15402 W. LITTLE youngblood HOUSTON TX

MDSE. SOLD CASH	MDSE. SOLD CHARGE	MDSE. RETURNED CASH	MDSE. RETURNED CREDIT	SALESMAN	ORDER NO.	CODE
✓				429		

QUAN.	PART NUMBER	DESCRIPTION	UNIT LIST	TOTAL NET
1	20802-W8226	CAT CLUTCH	422 81	338 01
		AIR FREIGHT		20 00

Paid Cash 9-13-85

TICKET NO. 1567 CUSTOMER NO. KEY I TOTAL 358 01

NO REFUNDS AFTER 30 DAYS. ALL CLAIMS AND RETURNED GOODS MUST BE ACCOMPANIED BY THIS BILL.

15% RESTOCKING CHARGE ON ALL RETURNED PARTS.

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NISSAN

DESCRIPTION	AMOUNT
PARTS-RETAIL	
PARTS-WHOLESALE	338 01
ACCESSORIES-RETAIL	
ACCESSORIES-WHOLESALE	
5% SD	20.00
TAX	—
CHARGE SALES	
CASH SALES	358 01

REC'D BY X

APPENDIX E

INDIVIDUAL TEST REPORT
FOR CATALYST NO. 4

REPORT OF INTERCOL'S CONFIRMATORY INSPECTION FOR MISFUELED 1980-83 LIGHT-DUTY GASOLINE PASSENGER CARS AND TRUCKS IN HOUSTON, TEXAS

INSPECTION STATION: NAME D+M AUTOMOTIVE

ADDRESS 23503 HARDY RD

PHONE NO. 353-2034

FAILED INSPECTION: DATE 8/85 ORIGINAL X PREVIOUS ___ ODOMETER 86 GID

FAILURE: MODIFIED FUEL INLET YES AND/OR POSITIVE PLUMBTESMO TEST YES

VEHICLE OWNER: NAME HAUS UTILITY SERVICE

ADDRESS 2201 SCHACA

PHONE NO. 353-9819

VEHICLE NO.: SWRI #4 LICENSE: STATE TX YEAR 85 NO. 9L1979

MAKE FORD YEAR 82 MODEL F150 GVWR 5250

MFR/ENGINE FAMILY ___ LDV ___ LDT X

VIN 1FTDF153CDA05946 BODY TYPE PICK-UP

ENGINE SERIAL NO.: NA ENGINE SIZE: CID ___ LITERS 5.0

ENGINE: TYPE LFM5J12WFL CYLINDERS ___

FUEL SYSTEM: CARBURETOR X BARRELS 2 INJECTION ___

POLLUTION CONTROL SYSTEM EGR-AIP-OC

VEHICLE CLASSIFICATION/TABLE 1: YEAR 82 NO. NA

INITIAL INSPECTION AT INTERCOL: DATE 9/3 INSPECTOR BOBBY

OEM CATALYST: YES X NO ___ MODIFIED FUEL INLET: YES ___ NO X

PLUMBTESMO: POSITIVE X NEGATIVE ___ FUEL SAMPLE OBTAINED YES

ELIGIBILITY STATUS: ACCEPT X REJECT ___ ODOMETER 86610

OEM CATALYST/EXHAUST AND/OR FUEL SYSTEM CONDITION: CAT + MUFFLER TO BE REPLACED.

EXHAUST AND/OR FUEL SYSTEM PARTS REQUIRED: ___

DATE EXHAUST AND/OR FUEL SYSTEM PARTS ORDERED 9/26/86

DATE EXHAUST AND/OR FUEL SYSTEM PARTS RECEIVED 9/26 DATE OWNER CONTACTED 9/26

DATE EXHAUST AND/OR FUEL SYSTEM PARTS INSTALLED 9/27/85

DATE FUEL TANK TOPPED WITH UNLEADED FUEL No.

CODING OF INDIVIDUAL PARTS FOR INSPECTION AND ANALYSIS AT SWRI: TAG OR PAINT SWRI VEHICLE NO. AND ENGINE SERIAL NO. ON EACH PART:

CATALYST ___ (IDENTIFY INLET, OUTLET, AND TOP SIDES: SEAL INLET/OUTLET ENDS/TAPE)

OXYGEN SENSOR NONE

FUEL SAMPLE ___ (SEAL CAP WITH TEFLON TAPE)

DATE SWRI NOTIFIED PARTS ARE READY FOR PICKUP 9/27/85

DATE PARTS PICKED UP 9/30/85

DATE 3/31/86

WORK ASSIGNMENT NO. 2-16
"CONTINUATION OF HOUSTON CATALYST COLLECTION"
(SwRI PROJECT 03-7774-016)

CATALYST NO. 4

Vehicle SwRI Code 4 Odometer Miles 86610 Vehicle Year and Make 1982 Ford Model F150 Pickup Vehicle VIN 1FTDF153CNA05946

Engine Family CFM50T2AAF4 Engine: CID 302 Liters 5.0

Engine Cyls. V8 Emission Control System EGR/AIR/OC

Fuel System: Carburetor 2BBL Fuel Injection _____

Date Vehicle Failed Inspection: Original 8/85 Previous _____

Failure Type: Modified Fuel Inlet No and/or Positive Plumbtesmo Test Yes

Date Exhaust and/or Fuel System Parts Installed 9/27/85

CATALYST NO. 4 (CONT'D)

Visual Inspection Summary In-line dual bed monolith catalyst with rusty and clay-smeared case, but in good condition showing no evidence of overheating. No internal looseness or rattle. Monolith shows small area of partial plugging at inlet, and gray to black coloring on outlet. No fractures or melts.

Testing

Catalyst Weight, lb* 12.06 Approximate Dimensions 17x8x3 in.

Plumbtesmo Test: Catalyst Inlet Positive Outlet Positive

Oxygen Sensor N/A

Catalyst X-Ray shows no abnormality

See positive photo of x-ray negative on next page.

Catalyst Backpressure, in. H_2O: 8.7 at Catalyst Inlet Temperature °F 730,

Engine RPM 1800, Engine Torque, ft/lb 43.8,

and Equivalent Engine CID of 305 (5.0 liters)

Catalyst Efficiency (%) HC 28.6 CO 29.1 NO_x 2.5

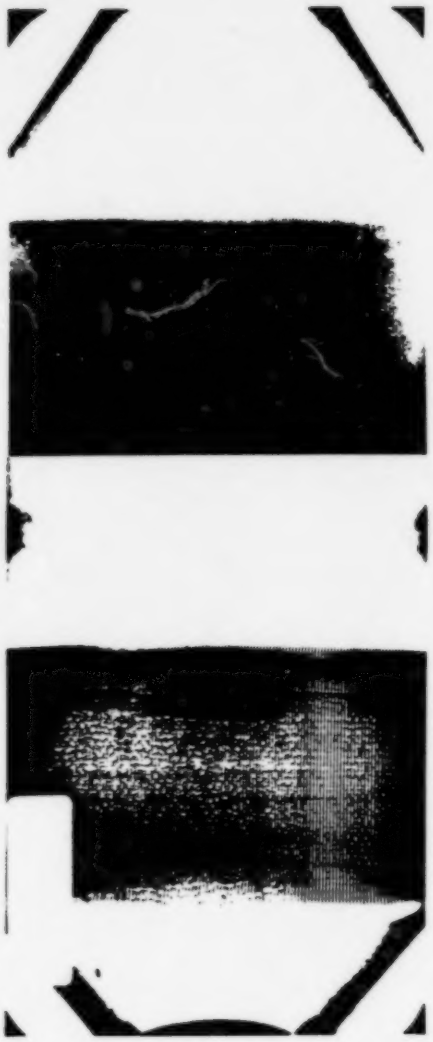
Atomic Absorption Lead Content Analysis for:

Sample	Pb, g/gal
Gasoline Sample # 4	0.002
EPA Reference 0001028	0.08
EPA Reference 0001975	0.017

*Catalyst weight includes weight of inlet and outlet pipes when integral to catalyst

CATALYST NO. 4 (CONT'D)

INLET



OUTLET

Positive Photo of X-Ray Negative - Catalyst No. 4

VEHICLE NO. 4

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ORIGINAL INVOICE

PARTS INVOICE

Westway Ford Inc.

"The Best Way to Ford Country"

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MAILING ADDRESS P O BOX 36344, HOUSTON, TEXAS 77036

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CUST I D	SALESMAN	SHIP VIA	WAYBILL NO	P O # OR P O #	TERMS	INVOICE DATE	INVOICE NUMBER

PAGE OF

SOLD TO

SHIP TO

$250.00

ITEM NO	ORDERED	SHIPPED	B/O	PART NUMBER	BIN	SR	DESCRIPTION	SUGGESTED LIST	NET	TOTAL NET
[redacted]										
2	1	1		E9SZ-9620-A	WALL	A	BELT ASY-RR SEAT	42.25		
3	10	10		E9SZ-9547-A	141	C	SEAL-RR SEAT BELT ANCHOR	83.95		
							SALE			

Pd 2407

NO RETURNS WITHOUT THIS INVOICE — TERMS NET CASH
NO REFUNDS AFTER 30 DAYS
NO REFUNDS OR EXCHANGES ON ELECTRICAL PARTS
NO REFUND ON ANY ELECTRICAL SPECIAL ORDERED AND OR FUEL PARTS
15 HANDLING CHARGE ON ALL RETURNED PARTS

X _____ RECEIVED BY

K 3487 (R 82)

APPENDIX F

INDIVIDUAL TEST REPORT
FOR CATALYST NO. 5

REPORT OF INTERCOL'S CONFIRMATORY INSPECTION FOR MISFUELED 1980-83 LIGHT-DUTY GASOLINE PASSENGER CARS AND TRUCKS IN HOUSTON, TEXAS

INSPECTION STATION: NAME D+M AUTOMOTIVE
ADDRESS 23503 HARDY RD
PHONE NO. 353-7034

FAILED INSPECTION: DATE 3/21/85 ORIGINAL X PREVIOUS ODOMETER 81196

FAILURE: MODIFIED FUEL INLET NEG AND/OR POSITIVE PLUMBTESMO TEST P/S

VEHICLE OWNER: NAME HOUS UTILITY SERVICE
ADDRESS 7700 SCIMCA
PHONE NO. 353-9809

VEHICLE NO.: SWRI #5 LICENSE: STATE TX YEAR 85 NO. RC1871

MAKE FORD YEAR 80 MODEL COURIER GVWR 4100

MFR/ENGINE FAMILY LDV LDT X

VIN SGTCXK-23632 BODY TYPE PICK-UP

ENGINE SERIAL NO.: N/A ENGINE SIZE: CID 122 LITERS

ENGINE: TYPE OHC CYLINDERS 4

FUEL SYSTEM: CARBURETOR X BARRELS 2 INJECTION

POLLUTION CONTROL SYSTEM EGR/AT

VEHICLE CLASSIFICATION/TABLE I: YEAR NA NO. NA

INITIAL INSPECTION AT INTERCOL: DATE 9/3 INSPECTOR BOBBY

OEM CATALYST: YES X NO MODIFIED FUEL INLET: YES NO X

PLUMBTESMO: POSITIVE X NEGATIVE FUEL SAMPLE OBTAINED X

ELIGIBILITY STATUS: ACCEPT X REJECT ODOMETER

OEM CATALYST/EXHAUST AND/OR FUEL SYSTEM CONDITION: CAT + TAIL PIPES

EXHAUST AND/OR FUEL SYSTEM PARTS REQUIRED:

DATE EXHAUST AND/OR FUEL SYSTEM PARTS ORDERED 9/25/85

DATE EXHAUST AND/OR FUEL SYSTEM PARTS RECEIVED 10/2 DATE OWNER CONTACTED 10/2

DATE EXHAUST AND/OR FUEL SYSTEM PARTS INSTALLED 10/2/85

DATE FUEL TANK TOPPED WITH UNLEADED FUEL NO

CODING OF INDIVIDUAL PARTS FOR INSPECTION AND ANALYSIS AT SWRI: TAG OR PAINT SWRI VEHICLE NO. AND ENGINE SERIAL NO. ON EACH PART:

CATALYST #5 (IDENTIFY INLET, OUTLET, AND TOP SIDES: SEAL INLET/OUTLET ENDS/TAPE)

OXYGEN SENSOR NONE

FUEL SAMPLE #5 (SEAL CAP WITH TEFLON TAPE)

DATE SWRI NOTIFIED PARTS ARE READY FOR PICKUP 9/27/85

DATE PARTS PICKED UP 9/30/85

DATE 8/29/86

WORK ASSIGNMENT NO. 2-16
"CONTINUATION OF HOUSTON CATALYST COLLECTION"
(SwRI PROJECT 03-7774-016)

CATALYST NO. 5

Vehicle SwRI Code 5 Odometer Miles 81176 Vehicle Year and Make 1980

Ford Model Courier Pickup Vehicle VIN SGTCXK-23632

Engine Family 2000 Engine: CID 120 Liters 2.0

Engine Cyls. L4 Emission Control System EGR/PLS/OC

Fuel System: Carburetor 2BBL Fuel Injection _____

Date Vehicle Failed Inspection: Original 3/21/85 Previous _____

Failure Type: Modified Fuel Inlet No and/or Positive Plumbtesmo Test Yes

Date Exhaust and/or Fuel System Parts Installed 10/2/85

CATALYST NO. 5 (CONT'D)

Visual Inspection Summary Single bed pelleted catalyst in good and clean condition (very light rust on outside surface of shield). Moderate looseness of pellets upon shaking. No burn-through holes or evidence of overheating. Dark brown color at inlet inside surface and light gray color at outlet inside surface.

Testing

Catalyst Weight, lb* 13.50 Approximate Dimensions 13" x 7 1/2" x 3 1/4"

Plumbtesmo Test: Catalyst Inlet Negative Outlet Positive

Oxygen Sensor N/A

Catalyst X-Ray Shows no abnormality

See positive photo of x-ray negative on next page.

Catalyst Backpressure, in. H_2O: 5.0 at Catalyst Inlet Temperature °F 705,

Engine RPM 1800, Engine Torque, ft/lb 71.6,

and Equivalent Engine CID of 128 (2.1 liters)

Catalyst Efficiency (%) $\frac{HC}{54.8}$ $\frac{CO}{66.7}$ $\frac{NO_x}{5.3}$

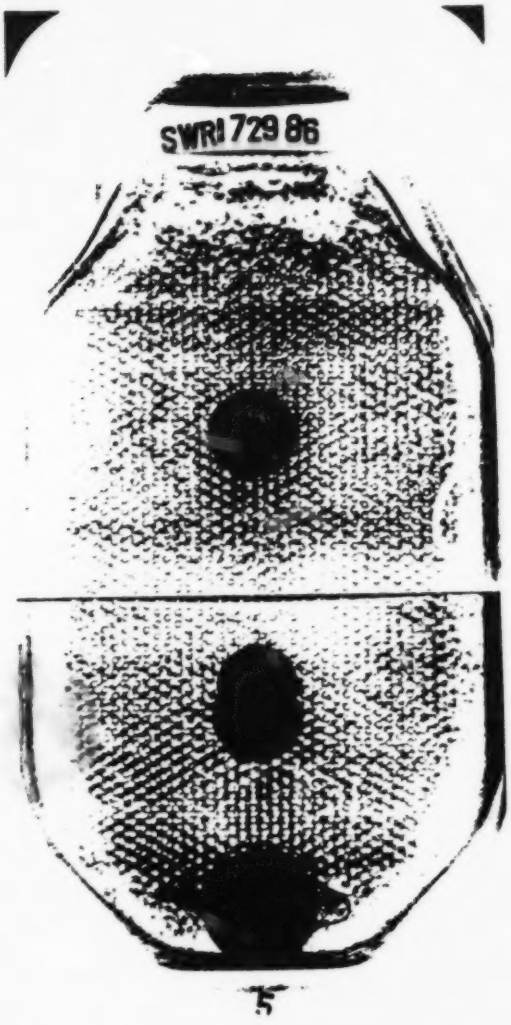
Atomic Absorption Lead Content Analysis for:

Sample	Pb, g/gal
Gasoline Sample # 5	0.002
EPA Reference 0001978	0.016

*Catalyst weight includes weight of inlet and outlet pipes when integral to catalyst

CATALYST NO. 5 (CONT'D)

INLET



OUTLET

Positive Photo of X-Ray Negative - Catalyst No. 5

VEHICLE NO. 5

ORIGINAL INVOICE

PARTS INVOICE

Westway Ford Inc.

"The Best Way to Ford Country"

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MAILING ADDRESS: P. O. BOX 36344, HOUSTON, TEXAS 77036

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CUST. I.D.	SALESMAN	SHIP VIA	WAYBILL NO	P.O. # OR R.O. #	TERMS	INVOICE DATE	INVOICE NUMBER
75F	HH0400					OCT/02/1985	92475
						PAGE 01 OF 01	

SOLD TO: CASH WHOLESALE
INTERCOLE CORP
15402 VANTAGE PARKWAY EAST

SHIP TO:

***** THANK YOU FOR YOUR BUSINESS *****

ITEM NO	ORDERED	SHIPPED	B/O	PART NUMBER	BIN	SR	DESCRIPTION	SUGGESTED LIST	NET	TOTAL NET
1	1	1		E2ZZ,5E212,A		11		304.85	242.90	243.90
2							SALES TAX			14.94
							TOTAL TAXABLE ITEMS.....			243.90
							TOTAL TAX.....			14.94
							CASH SALES			258.84

#8499

NO RETURNS WITHOUT THIS INVOICE — TERMS NET CASH
NO REFUNDS AFTER 30 DAYS
NO REFUNDS OR EXCHANGES ON ELECTRICAL PARTS
NO REFUND ON ANY ELECTRICAL, SPECIAL ORDERED AND/OR FUEL PARTS
15% HANDLING CHARGE ON ALL RETURNED PARTS

X _____
RECEIVED BY

K3487 (8-82)